

APPENDIX 3.10.2.

GUIDELINES ON THE DETECTION, CONTROL AND PREVENTION OF *SALMONELLA* ENTERITIDIS AND *S. TYPHIMURIUM* IN POULTRY PRODUCING EGGS FOR HUMAN CONSUMPTION

Article 3.10.2.1.

Introduction

The aim of the *Terrestrial Code* is to assist Member Countries in the management and control of significant animal diseases, including diseases with zoonotic potential, and in developing animal health measures applicable to trade in terrestrial animals and their products. This guideline provides recommendations on the detection, control and prevention of *Salmonella Enteritidis* and *S. Typhimurium* in poultry producing eggs for human consumption.

S. Enteritidis and *S. Typhimurium* belong to the species of *S. Enterica*. In most food animal species, *S. Enteritidis* and *S. Typhimurium* can establish a clinically inapparent infection in poultry, of variable duration, which is significant as a potential zoonosis. Such animals may be important in relation to the spread of infection between flocks and as causes of human food poisoning. In the latter case, this can occur when these animals, or their products, enter the food chain thus producing contaminated food products.

Salmonellosis is one of the most common food-borne bacterial diseases in the world. It is estimated that over 90% of *Salmonella* infections in humans are food-borne with *S. Enteritidis* and *S. Typhimurium* accounting for major part of the problem. Egg-associated salmonellosis, particularly *S. Enteritidis*, is an important public health problem worldwide.

Article 3.10.2.2.

Purpose and scope

This guideline deals with methods for on farm detection, control and prevention of *S. Enteritidis* and *S. Typhimurium* in poultry producing eggs for human consumption. This guideline complements the Codex Alimentarius draft Code of hygienic practice for eggs and egg products (ALINORM 07/28/13, appendix II). It covers the preharvest part of the

production chain from elite flock to the commercial layer farm. The objective is to control *Salmonella* in poultry with the goal of producing *Salmonella* free eggs.

The scope covers chickens and other domesticated birds used for the production of eggs for human consumption. The recommendations presented in this guideline are also relevant to the control of other *Salmonella* serotypes.

Article 3.10.2.3.

Definitions (for this chapter only)

Peak of lay

means the time in the laying cycle (normally expressed as age in weeks) when the production of the flock is highest.

Pullet flock

means a flock of poultry prior to the period of laying eggs for human consumption.

Layer flock

means a flock of poultry during the period of laying eggs for human consumption.

Competitive exclusion

means the administration of bacterial flora to poultry to prevent gut colonisation by enteropathogens, including *Salmonellae*.

Culling

means the depopulation of a flock before the end of its normal production period.

Article 3.10.2.4.

Hazards in poultry breeding flocks, hatcheries and poultry producing eggs for human consumption

All measures to be implemented in breeding flocks and hatcheries are described in Chapter 2.10.2. on *Salmonella Enteritidis* and *Salmonella Typhimurium* in Poultry and in Appendix 3.4.1. on hygiene and disease security procedures in poultry breeding flocks and hatcheries.

This guideline deals with poultry producing eggs for human consumption. The rest of the food chain is addressed by the Codex Alimentarius draft code of hygienic practice for eggs and egg products.

Article 3.10.2.5.

Biosecurity recommendations applicable to pullet and layer flocks

1. Access to the *establishment* should be controlled to ensure only authorized persons and conveyances enter the site. This may require that the *establishment* be surrounded by a security fence. The choice of a suitably isolated geographical location, taking into account the direction of the prevailing winds, facilitates hygiene and disease control. A sign indicating restricted entry should be posted at the entrance.
2. *Establishments* should operate on an 'all in - all out' single age group whenever possible.
3. Where several flocks are maintained on one *establishment*, each flock should be managed as separate entities.
4. Poultry houses and buildings used to store feed or eggs should be pest proof and not accessible to wild birds.
5. Poultry houses should be constructed so that cleaning and *disinfection* can be carried out adequately and preferably of smooth impervious materials.
6. *Establishments* should be free from unwanted vegetation and debris. The area immediately surrounding the poultry houses ideally should consist of concrete or other material to facilitate cleaning. An exception to this would be trees for heat control, with the exception of fruit trees which could be attractive to birds.
7. Domestic animals, other than poultry, should not be permitted access to poultry houses and buildings used to store feed or eggs.
8. Clean coveralls or overalls, hats and footwear should be provided for all personnel and visitors entering the poultry house. A disinfectant foot-bath should be provided, and the disinfectant solution should be changed regularly as recommended by the manufacturer. Personnel and visitors should wash their hands with soap and water or in a disinfectant solution before and after entering the layer house.
9. When a poultry house is depopulated, all faeces and litter should be removed from the house and disposed of in a manner approved by the *Veterinary Services*. After removal of faeces and litter, cleaning and *disinfection* of the building and equipment should be applied in accordance with Appendix 3.6.1.

Bacteriological monitoring of the efficacy of *disinfection* procedures is recommended when *S. Enteritidis* and/or *S. Typhimurium* have been detected in the flock. Routine pest control procedures should also be carried out at this time.

10. Birds used to stock a pullet house should be obtained from breeding flocks that are certified as free from *S. Enteritidis* and *S. Typhimurium* and have been monitored according to Article 3.4.1.9.

11. Layer flocks should be stocked from pullet flocks that are certified as free from *S. Enteritidis* and *S. Typhimurium* and have been monitored according to this guideline.
12. While *S. Enteritidis* and *S. Typhimurium* are not normally found as a contaminant in feed, it is nonetheless recommended to monitor the salmonella status of feed used in poultry houses. The use of pelletised feeds or feeds subjected to other bactericidal treatment is recommended. Feed should be stored in clean closed containers to prevent access by birds and pests. Spilled feed should be cleaned up regularly to remove attractants for wild birds and pests.
13. The water supply to poultry houses should be potable according to the World Health Organization or to the relevant national standard, and microbiological quality should be monitored if there is any reason to suspect contamination.
14. Sick or dead birds should be removed from poultry houses as soon as possible and at least daily, and effective and safe disposal procedures implemented.
15. Records of flock history and performance, surveillance, treatment and vaccinations in regard to *Salmonella* should be maintained on an individual flock basis within the establishment. Such records should be readily available for inspection.
16. There should be good communication and interaction between all involved in the food chain so that control can be maintained from breeding to egg production and consumption. Farmers should have access to basic training on hygiene and biosecurity measures relevant to egg production and food safety.
17. For poultry flocks that are allowed to range outdoors, the following provisions apply:

Attractants to wild birds should be minimised (e.g. commercial feed and watering points should be kept inside the poultry house if possible). Poultry should not be allowed access to sources of contamination (e.g. household rubbish, other farm animals, surface water and manure storage areas). The nesting area should be inside the poultry house.

Article 3.10.2.6.

Recommendations applicable to egg hygiene and collection

1. Cages should be maintained in good condition and kept clean. The litter in the poultry house should be kept dry and in good condition. The nest box litter should be kept clean and an adequate quantity maintained.
2. Eggs should be collected at frequent intervals, not less than twice per day, and placed in new or clean and disinfected trays.

3. Dirty, broken, cracked, leaking or dented eggs should be collected separately and should not be used as table eggs.
4. Eggs should be stored in a cool and dry room used only for this purpose. Storage conditions should minimise the potential for microbial contamination and growth. The room should be kept clean and regularly sanitised.
5. Records of egg production should be kept to assist traceability and veterinary investigations.
6. If eggs are cleaned on the farm, this should be done in accordance with the requirements of the Competent Authority.

Article 3.10.2.7.

Surveillance of pullet and layer flocks for *S. Enteritidis* and *S. Typhimurium*

Surveillance should be performed to identify infected flocks in order to take measures that will reduce transmission of *S. Enteritidis* and *S. Typhimurium* to humans and to reduce the prevalence in poultry. Microbiological testing is preferred to serological testing because of its higher sensitivity and specificity. In the framework of regulatory programmes for the control of *S. Enteritidis* and *S. Typhimurium*, confirmatory testing may be appropriate to ensure that decisions are soundly based.

Sampling

1. Time and frequency of testing

- a) Pullet flock testing

- i) Four weeks before being moved to another house, or before going into production if the animals will remain in the same house for the production period.
- ii) At the end of the first week of life when the status of breeding farm and hatchery is not known or does not comply with Chapter 2.10.2.
- iii) One or more times during the growing period if there is a *culling* policy in place. The frequency would be determined on commercial considerations.

- b) Layer flock testing

- i) At expected *peak of lay* for each production cycle.
- ii) One or more times if there is a *culling* policy in place or if eggs are diverted to processing for the inactivation of the pathogen. The minimal frequency would be determined by the *Veterinary Services*.
- c) Empty building testing

Environmental sampling of the empty building after depopulation, cleaning and *disinfection*, following a *S. Enteritidis* and *S. Typhimurium* positive flock.

2. Available methods for sampling

Drag swabs: Sampling is done by dragging swabs around the poultry building.

Boot swabs: Sampling is done by walking around the poultry building with absorbent material placed over the footwear of the sampler.

Faecal samples: Multiple samples of fresh faeces collected from different areas in the poultry building.

3. Number of samples to be taken according to the chosen method

Recommendation is 5 pair of boot swabs or 10 drag swabs. These swabs may be pooled into no less than 2 samples. 5 Pair of boot swabs correspond to 300 faeces samples.

The total number of faecal samples to be taken on each occasion is shown in Table I and is based on the random statistical sample required to give a probability of 95% to detect one positive sample given that infection is present in the population at a level of 5% or greater.

Table I

Number of birds in the flock	Number of samples to be taken on each occasion
25-29	20
30-39	25
40-49	30
50-59	35
60-89	40

90-199	50
200-499	55
500 or more	60

4. Laboratory methods

Refer to the *Terrestrial Manual*.

Article 3.10.2.8.

Control measures

Salmonella control can be achieved by adopting the management practices mentioned above in combination with the following measures. No single measure used alone will achieve effective *S. Enteritidis* and *S. Typhimurium* control.

Currently available control measures are: vaccination, *competitive exclusion*, flock *culling* and product diversion to processing. Antimicrobials, *competitive exclusion* and live vaccination are used in elite flocks.

Antimicrobials are not recommended to control *S. Enteritidis* and *S. Typhimurium* in poultry producing eggs for human consumption because the effectiveness of the therapy is limited; it has the potential to produce residues in the eggs and can contribute to the development of antimicrobial resistance.

1. Vaccination

Many inactivated vaccines are used against *Salmonella* infections caused by different serovars in various poultry species, including a single or combined vaccine against *S. Enteritidis* and *S. Typhimurium*.

Live vaccines are also used in a number of countries to prevent *Salmonella* infections in poultry. It is important that field and vaccine strains can easily be differentiated in the laboratory. Vaccines produced according to the *Terrestrial Manual* should be used.

Vaccination can be used as part of an overall *Salmonella* control programme. Vaccination should never be used as the sole control measure.

When the status of breeding farm and hatchery from which the *pullet flock* originates is not known or does not comply with Chapter 2.10.2., vaccination of *pullet flocks*, starting with day-old chicks, against *S. Enteritidis* or *S. Enteritidis/S. Typhimurium* should be considered.

Vaccination should be considered when moving day-old chicks to a previously contaminated shed so as to minimize the risk of the birds contracting infection with *S. Enteritidis* and *S. Typhimurium*.

When used, vaccination should be performed according to the instructions provided by the manufacturer and in accordance with the directions of the *Veterinary Services*.

2. Competitive exclusion

Competitive exclusion can be used in day old chicks to reduce colonisation by *S. Enteritidis* and *S. Typhimurium*.

3. Culling

Depending on animal health and public health policies, culling is an option to manage infected flocks. If poultry are not culled, eggs should be sent for processing for inactivation of pathogens. Infected flocks should be destroyed or slaughtered and processed in a manner that minimises human exposure to pathogens.

Before restocking, the poultry house should be cleaned, disinfected and tested to verify that the cleaning has been effective (see above).

Farmers should be educated on how to handle *Salmonella* infected flocks in order to prevent spread to adjacent farms and human exposure.

Article 3.10.2.9.

Prevention of Salmonella spread

When a *layer flock* or *pullet flock* is found infected with *S. Enteritidis* and *S. Typhimurium*, management procedures should be implemented.

In addition to the general control measures described previously, management procedures should be adjusted to effectively isolate the infected flock from other flocks on the farm, adjacent farms and from other farms under common management.

1. Personnel should observe standard disease control procedures (e.g. handle infected flock separately/last in sequence and use of dedicated personnel and clothing and, if possible equipment).
2. Pest control measures should be observed stringently
3. Epidemiological investigations should be carried out to determine the origin of new infections as appropriate to the epidemiological situation.

4. Movement of *culled* poultry or layers at the end of the production cycle should only be allowed for slaughter or destruction.
 5. Poultry litter/faeces and other potentially contaminated farm waste should be disposed of in a safe manner to prevent the spread of infections with *S. Enteritidis* and *S. Typhimurium*. Particular care needs to be taken in regard to poultry litter/faeces used to fertilise plants intended for human consumption.
 6. After depopulation of an infected flock the poultry house should be thoroughly cleaned and disinfected, with special attention to feed equipment and water systems.
 7. Before restocking bacteriological examination should be carried out, if possible, to verify that the cleaning has been effective.
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